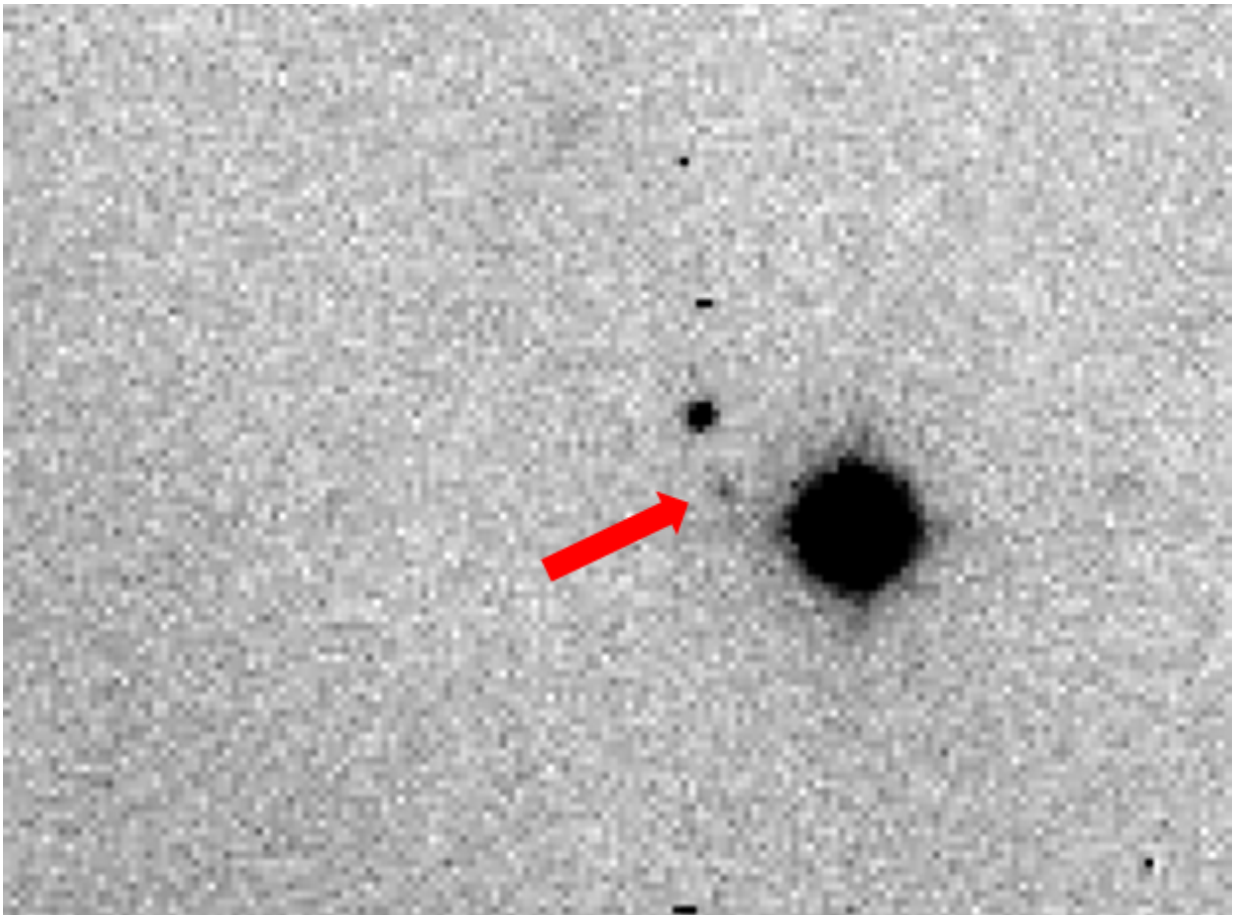


# Old data reveals space rock poses little threat of hitting Earth any time soon

January 10 2017

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The 2003 ‘precovery’ image of asteroid 2016 WJ1, which was ‘refound’ in 2016 by the Catalina Sky Survey. The asteroid appears as a faint spot between two bright stars. The orbit of 2016 WJ is rather peculiar, having both nodes – the two intersections of the asteroid’s orbit plane with the orbit plane of Earth – very close to Earth’s orbital radius. Credit: Canada-France-Hawaii Telescope

Careful sleuthing through decade-old images has enabled ESA's asteroid team to decide that a newly discovered space rock poses little threat of hitting Earth any time soon.

Spotting a previously unknown asteroid for the first time always raises the big question: is there a risk it will impact Earth?

Yet, upon discovery, analysts often have very little to go on. The initial image from the observatory, survey team or individual backyard astronomer who spotted the rock typically gives only basic information – its location in the sky and its brightness – and sometimes these aren't known terribly accurately.

The most crucial information needed to determine with any degree of confidence whether it is a 'near-Earth object' (NEO) – and that it will miss Earth (or not) – is the new object's path. And determining that requires a series images acquired over a period of days or even months.

"We need multiple follow-on images to compute the trajectory and make a risk estimate, but even then the uncertainty can be very large. It really takes many months of observations to get a good, reliable impact risk estimate, and in the meantime, there can be reason to worry," says Ettore Perozzi of the NEO Coordination Centre at ESA's facility in Italy.

## **Spotted from Arizona**

This is precisely what happened on 19 October, when asteroid 2016 WJ1 was discovered by the Catalina Sky Survey.

Additional images were taken by observers worldwide over the next few weeks, including by a team working at ESA's own observatory on Tenerife in the Canary Islands, but uncertainty of the path meant that a possible close approach in June 2065 – with a worrying impact

probability of about 1 in 8000 – could not be excluded.

"The additional images allowed us to refine our knowledge of the trajectory sufficiently to begin searching astronomical archives, to see if anyone had previously imaged this asteroid without having recognised it as such," says Marco Micheli, observer at the NEO centre.

If any were found, the team would score what astronomers call a 'precovery' – short for pre-discovery.

## **Precovering**

The investigation quickly bore fruit: images found online from the Pan-STARRS survey taken earlier in October showed what might be the target asteroid.

While these were inconclusive, the team assumed they were, in fact, accurate and then used these to call up additional, highly accurate images from a Canadian astronomical image search system.

Bingo: two sets of images from 4 and 5 July 2003 with the Canada–France–Hawaii Telescope were found.

"After careful inspection we were able to pinpoint the object, and the team were able to perform some very accurate determinations," says Detlef Koschny, responsible for the NEO portion of ESA's Space Situational Awareness programme.

"The result was that we could preclude any risk of Earth impact from [asteroid](#) 2016 WJ1 anytime soon or well into the future."

ESA is now developing a new set of automated, wide-field-of-view 'Fly-Eye' telescopes that will conduct nightly sky surveys, creating a large

future archive of images that will make critical precovery confirmations more efficient in future.

Provided by European Space Agency

Citation: Old data reveals space rock poses little threat of hitting Earth any time soon (2017, January 10) retrieved 25 April 2024 from <https://phys.org/news/2017-01-reveals-space-poses-threat-earth.html>

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